A Decent Proposal?

EPA's New Clean Air Standards

A person inhales at least 8,000 liters of air each day, in the process breathing in an alphabet soup of pollutants, including ozone and tiny dust particles. Is this soup dangerous? Probably not for a healthy person. But for people with asthma, these environmental contaminants can send them coughing to the doctor—or even racing to the hospital.

In July 1997, the EPA will issue new air quality standards to tighten limits on ozone and fine particles. The new standards are meant to better shield children, the elderly, and persons with respiratory disease from the choking effects of smog and soot.

On the surface, the task of devising new standards may seem simple enough. But the EPA's proposals—released in draft form last November—are provoking hot debate, from university hallways to congressional corridors. Questions about the proposals include whether the science behind the new air standards is sound, whether the policy makes sense, and whether the costs might overwhelm states and industry. Experts disagree on each of these points, and conclusions are as hazy as the Los Angeles skyline during rush hour.

As the EPA's deadline for promulgating new standards nears, the frenzy heightens. More than a dozen newspaper editorials have urged Congress to reject the air standards—or at least pressure the EPA to tone them down. On the other hand, 27 scientists recently sent President Clinton a letter strongly supporting the proposals. Everyone agrees on just one point—the magnitude of the issue. "This is the most significant environmental health decision facing the Clinton administration," says Deborah Sphrentz, a research analyst at the Natural Resources Defense Council in Washington, DC.

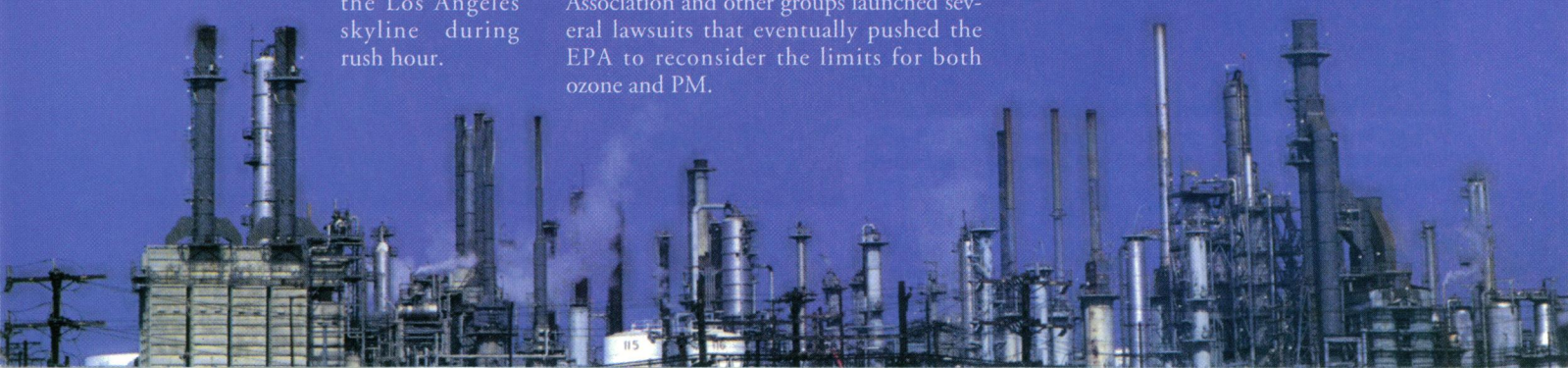
Facts and Figures

Under the Clean Air Act, it's the EPA's job to set National Ambient Air Quality Standards (NAAQS)—or maximum allowable concentrations—for six pollutants: ozone, particulate matter (PM), nitrogen dioxide, carbon monoxide, sulfur dioxide, and lead. The EPA is supposed to review each standard every five years. By the early 1990s, however, the agency had fallen behind schedule. The American Lung Association and other groups launched several lawsuits that eventually pushed the EPA to reconsider the limits for both ozone and PM.

The agency's response came last fall. With help from two independent boards of scientists from the Clean Air Scientific Advisory Committee (CASAC)—one panel each for ozone and PM—the EPA evaluated several thousand studies. Based on assessment of 185 key health studies of ozone and 86 studies of PM, the agency concluded that current standards for these pollutants do not adequately protect sensitive populations, such as the sick, the young, and the elderly.

While ozone and PM do not appear to cause respiratory disease, they can aggravate existing conditions. "[Ozone and particulates] can lead to lung inflammation," explains George D. Thurston, a professor of environmental medicine at the New York University School of Medicine in New York City. "With asthmatics, for example, you try to keep lung inflammation down. The child with inflammation is more likely to have an asthma attack or to get a more severe asthma attack." As many as 15 million Americans suffer from asthma.

The EPA suggests the proposed ozone and PM standards would have benefits



totaling $112 billion a year in the form of fewer premature deaths, hospital admissions, and visits to the doctor. Reaping those benefits, however, would take a lot of work. By most estimates, roughly half of all U.S. counties currently fail to meet one—if not both—of the proposed air standards. Bringing every county into compliance would take $6–8 billion a year for at least a decade, the EPA says.

Devising the Proposals

The EPA's proposed ozone standard is fairly straightforward. Ground-level ozone is the main ingredient in smog—a cloud of chemicals resulting from car exhaust, smokestack emissions, and other types of combustion. The NAAQS for ozone currently allows no more than 0.12 parts of ozone per million (ppm) parts of air. Each state monitors ozone levels over the course of one-hour intervals. The EPA's proposed standard would allow no more than 0.08 ppm of ozone, averaged over eight-hour periods. The agency is also considering alternative 0.07 or 0.09 ppm standards. The EPA's goal is to better protect people inhaling low levels of ozone for several hours at a time, such as children playing outside in the summer.

Setting a standard for particulate matter is more complicated, and controversial. Rather than a single chemical, PM is a hodgepodge of liquid and solid particles traveling in the air. The current NAAQS regulates particles with a diameter of 10 microns or less (PM_{10}), which primarily waft in the dust from farms and mines. Under the EPA's new rules, a separate standard would also be set for fine particles—those with a diameter of 2.5 microns or less ($PM_{2.5}$). These tinier particles emerge from combustion at power plants and steel mills, and in diesel trucks, among other sources. When inhaled, scientists say, it's these small pollutants that lodge deep in the lungs and cause the most harm.

The proposed standards are just that: proposals. They could appear differently in the EPA's final rules this summer. Even then, Congress is expected to review the new standards and could vote them down entirely. During congressional hearings this spring, Senator John Chafee (R-Rhode Island), chairman of the Environment and Public Works Committee, warned EPA Administrator Carol M. Browner that "even in the name of health, it is possible to push too far, too fast."

Complicating the Controversy

The tumult over the proposed ozone and PM standards goes to the heart of environmental regulation, roiling around three core issues: risk-based science, public policy, and economics.

Many epidemiologists believe that fine particles and ozone in the air aggravate a host of respiratory problems, sometimes to the point of causing premature death. But toxicologists say they know little about the mechanisms by which these pollutants, especially fine particles, cause adverse health effects at the proposed standards. In the end, they say, the scientific uncertainty inevitably leads to a judgment call by policy makers.

But the policy decisions, too, are under debate. The Clean Air Act mandates the EPA to create air standards that protect public health—including that of the most sensitive populations—with an "adequate margin of safety." For 20 years, scientists have questioned how feasible this mandate is. Some say it's impossible to determine a margin of safety because researchers can't agree on a minimum threshold for pollution's health effects. Moreover, some analysts say it's more reasonable to set standards that protect the majority of the population from serious health risk, rather than try to eliminate *any* health risk for sensitive populations. Economists would also like to see cost–benefit analysis added to air quality standards considerations.

The Clean Air Act requires the EPA to set air standards based on public health, regardless of expense. Money enters the equation only later, when it's time for states to design pollution controls that meet the standards. But even if the EPA isn't focusing on the cost of its proposals, others certainly are. As expected, representatives from coal, oil, and other industries decry the new standards as financially devastating. And they are not alone.

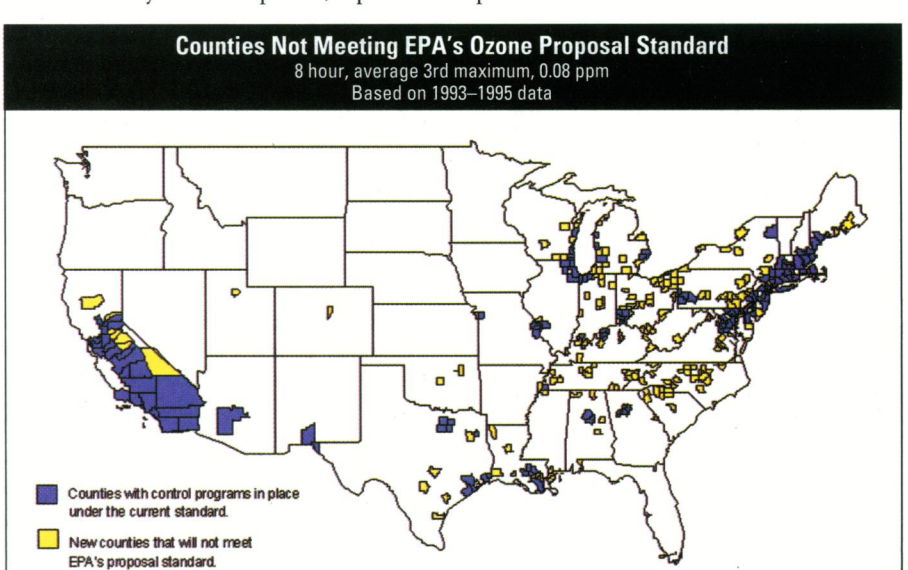
Governors and regulators in midwestern states say the new standards could throw the country's midsection into nonattainment status and force it to launch new pollution controls. In Ohio, for example, three cities—Cleveland, Toledo, and Dayton—just achieved the current ozone standard. If the new standards go into effect, Ohio, Nebraska, and other states will probably tighten auto inspection rules and force installation of catalytic converters on power plants to provide the necessary pollution controls. These measures could end up costing consumers time and money.

"The real controversy won't hit the general public for five years, when these standards truly take effect," says Don Schregardus, director of the Ohio EPA. "But I'm telling you that this is the time to ask whether these standards are too stringent." In a few years, Schregardus says, the new standards are going to make a big difference to a lot of people.

How Sound is the Science of $PM_{2.5}$?

By all accounts, the nation's air has gotten cleaner over the past decade. According to EPA air quality reports, most ozone-forming emissions dropped by more than 10% between 1985 and 1994. There are similar statistics for PM_{10} emissions. Still, a growing number of studies suggest today's levels of ozone and PM have negative health effects. $PM_{2.5}$—now regulated as a fraction of PM_{10}—has researchers most worried.

PM studies have typically tracked hospital admissions and other health measures



Source: EPA Office of Air and Radiation World Wide Web site at (http://ttnwww.rtpnc.epa.gov/naaqspro/).

Counties Not Meeting the Current PM_{10} Standards

24-hour, 150 μg/m³, 1 exceedance; annual-50 μg/m³
(Based on 1993–1995 data)

State	County	1990 Population
AK	ANCHORAGE BOROUGH	226,300
AK	JUNEAU BOROUGH	26,800
AZ	MARICOPA CO	2,122,101
CA	FRESNO CO	667,490
CA	IMPERIAL CO	109,303
CA	INYO CO	18,281
CA	KERN CO	543,477
CA	KINGS CO	101,469
CA	LOS ANGELES CO	8,863,164
CA	MONO CO	10,000
CA	ORANGE CO	2,410,556
CA	RIVERSIDE CO	1,170,413
CA	SAN BERNARDINO CO	1,418,380
CA	SAN DIEGO CO	2,498,016
CA	SANTA CRUZ CO	229,700
CA	TULARE CO	311,921
CT	NEW HAVEN CO	804,219
ID	BANNOCK CO	66,000
IL	RANDOLPH CO	34,600
IN	LAKE CO	475,600
IA	CERRO GORDO CO	46,700
IA	SCOTT CO	151,000
MN	RAMSEY CO	485,800
MT	FERGUS CO	12,100
MT	FLATHEAD CO	59,200
MT	MADISON CO	6,000
MT	PARK CO	14,600
MT	ROSEBUD CO	10,500
NE	CASS CO	21,300
NV	WASHOE CO	254,700
OH	CUYAHOGA CO	1,412,140
OR	LAKE CO	7,200
OR	LANE CO	282,900
OR	UMATILLA CO	59,200
PA	ALLEGHENY CO	1,336,449
PA	PHILADELPHIA CO	1,585,577
TX	LUBBOCK CO	222,600
UT	UTAH CO	263,600
WA	SPOKANE CO	361,400
WA	WALLA WALLA CO	48,400
WV	HANCOCK CO	35,200
		28,784,400

Counties Projected Not to Meet EPA's Proposed $PM_{2.5}$ Standards[a]

24-hour, 50.0μg/m³,98th percentile,
annual arithmatic mean-15.0μg/m³, spatial average
(Based on 1993–1995 data)

State	County	1990 Population
AK	ANCHORAGE BOROUGH	226,340
AK	JUNEAU BOROUGH	26,750
AL	ESCAMBIA CO	35,500
AL	ETOWAH CO	99,800
AL	MOBILE CO	378,600
AZ	MARICOPA CO	2,122,100
AZ	SANTA CRUZ CO	29,700
AR	ARKANSAS CO	21,700
CA	FRESNO CO	667,500
CA	IMPERIAL CO	109,300
CA	INYO CO	18,280
CA	KERN CO	543,500
CA	KINGS CO	101,500
CA	LOS ANGELES CO	8,863,200
CA	MADERA CO	88,100
CA	MERCED CO	178,400
CA	ORANGE CO	2,410,600
CA	RIVERSIDE CO	1,170,400
CA	SAN BERNARDINO CO	1,418,400
CA	SAN DIEGO CO	2,498,020

continued p. 382

in a given geographical area, comparing these rates with central counts of ambient PM. Douglas Dockery, an associate professor of environmental epidemiology at the Harvard School of Public Health, and colleagues have performed a handful of such studies on $PM_{2.5}$. "The epidemiological evidence is pretty overwhelming, showing that fine particles are associated with changes in lung function, hospital admissions, and mortality," Dockery says.

In an often-cited 1993 study published in the *New England Journal of Medicine*, Dockery and others found that people living in cities heavily polluted by particulates face higher mortality rates than people living in cleaner areas. While the death tolls win headlines, Dockery says the real story is the day-to-day havoc $PM_{2.5}$ wreaks on people's lungs. "When you look at the data, you see more of an effect on things like asthma, chronic obstructive pulmonary disease [COPD], and pneumonia," he says. These are the diseases that—when aggravated by daily clouds of $PM_{2.5}$—send people to the hospital.

Exposure to ozone at levels even well below the current health-based air quality standard can produce significant decreases in lung function, inflammation of the lung lining, and respiratory discomfort.

Beyond these few $PM_{2.5}$ studies, scientists have tried to isolate the role of fine particles using research on PM_{10}, on which the current regulatory standard is based. Thurston notes that these studies, too, suggest a correlation between $PM_{2.5}$ and hospital admissions for respiratory problems.

On the basis of studies like these, the EPA estimates that cutting $PM_{2.5}$ pollution could save 20,000 lives each year, particularly among the elderly and those with existing heart or lung conditions like COPD. Hospital admissions related to respiratory problems could drop by 9,000 a year.

But epidemiological correlations do not equal causation, and scientists say they're uncertain about $PM_{2.5}$'s exact health effects. One problem is that $PM_{2.5}$ is a catch-all category of tiny particles, from toxic bits of lead and arsenic to more innocuous flecks of carbon. "We don't really know what it is about the particles that's causing these effects," acknowledges Dockery. The most toxic chemicals in the $PM_{2.5}$ mix could directly affect lung function. Or perhaps these chemicals work as carriers, shuttling other toxic agents into the lungs.

This uncertainty makes some researchers question the wisdom of a $PM_{2.5}$ air standard. "The category of '$PM_{2.5}$' is too broad," contends Robert Phalen, director of the Air Pollution Health Effects Laboratory at the University of California at Irvine. "It's just too much of a shotgun approach. I think we've got to identify the causal agent. We've got to identify the affected population. And we've got to identify the biochemical mechanism."

Indeed, the phrase "biochemical mechanism" seems to stick in the minds of many toxicologists when they consider a $PM_{2.5}$ standard. "What specific physical or chemical characteristics of particles cause injury?" asks Roger McClellan, president of the Chemical Industry Institute of Toxicology in Research Triangle Park, North Carolina. "And what mechanisms are involved in causing biological responses? What is the relationship between sources of fine particles, exposure in the atmosphere, and dosage to various body tissues and health responses? The relationship to sources must be known if effective control strategies are to be developed that will really have positive health impacts."

McClellan served on the 21-member CASAC panel reviewing the PM data for the EPA. He was one of just two scientists who voted against the $PM_{2.5}$ standard. In addition to biochemical questions, McClellan points out that particles can emerge from secondary sources, like chemical reactions in the atmosphere. Humid weather, for example, might affect the level of fine particles measured in the air. He argues that scientists need more data before they can be sure that a $PM_{2.5}$ standard is the right size cut and that a non-chemical-specific standard is appropriate. McClellan recommends that the EPA reaffirm the PM_{10} standard and provide leadership for developing a five-year, $50 million per year research effort that will create the science needed for revisiting the PM standard during the EPA's next five-year review.

According to a 1995 American Lung Association report, exposure to ozone air pollution at levels below the current national air quality standard (based on the 0.08 ppm eight-hour average ozone level) puts 1.9 million children with asthma at risk from suffering adverse health effects.

In an October 1996 editorial in the *Journal of the Air & Waste Management Association*, George Wolff, chair of the CASAC panel on PM and a scientist at General Motors Corporation, said that various panel members had expressed concern over confounding variables in $PM_{2.5}$'s epidemiological data, measurement errors, alternative explanations for health effects, lack of toxicological understanding about $PM_{2.5}$, and the use of different models in PM studies.

The CASAC's conflicting views on $PM_{2.5}$ extend to the larger scientific community, says Lester Grant, director of the EPA's National Center for Environmental Assessment in Research Triangle Park. "It would be misleading to try to claim that there's a solid across-the-board agreement on $PM_{2.5}$," Grant says. "However, Clean Air Act mandates point the EPA administrator toward taking steps to protect the public health even in the face of scientific uncertainties and controversy."

Labs at Harvard, the University of Washington at Seattle, and other universities have now begun toxicology studies to gather biochemical data on $PM_{2.5}$. "People are scurrying around trying to develop systems that can concentrate suspended particles long enough [for them to be breathed in] and to study them," says Jane Koenig, a professor of environmental health at the University of Washington. "And a few studies also have been done with rats made bronchitic. When they are exposed to [particles], they do die."

Scientists note that the cry for more data can continue indefinitely—particularly if industry sees this as a strategy for avoiding new regulations. Dockery recalls that in 1987, when the EPA set the PM_{10} air standard, virtually no studies had been performed on PM_{10}. Even then, he says, many scientists suggested a $PM_{2.5}$ standard would be more beneficial.

Koenig adds that researchers may never have all the answers about fine particles, but that that shouldn't necessarily impede its regulation. "The fact is, [for example], we still don't really know the mechanisms for all the lung pathologies associated with cigarette smoking," she says, "and it would be ridiculous to say we're not going to regulate that." At some point, many scientists agree, policy makers must simply gather the information they've got, analyze it, and forge ahead with proposed air standards, no matter how unpopular.

That's just what the EPA has done. The agency's proposed standard maintains current standards for PM_{10}, adding new requirements for $PM_{2.5}$. These fine particles would be allowed in concentrations of 50 micrograms per cubic meter ($\mu g/m^3$) daily and 15 $\mu g/m^3$ annually. The EPA would dictate how to gather and analyze $PM_{2.5}$ data, as well as how many times a geographic area could exceed $PM_{2.5}$ standards and still be considered compliant.

The Policy of Protection

Compared to PM, the amount of biochemical data on ozone is overwhelming. Researchers know that ozone forms in the presence of heat from nitrogen oxides and volatile organic compounds. In chamber studies, field studies, and lab experiments, both humans and animals suffer short-term respiratory effects from ozone at current allowable levels. People who inhale small amounts of ozone for several hours may not breathe as effectively.

This scenario may occur every summer, when millions of children spend countless hours outside. In particular, the EPA reports, children with asthma may be at risk. The agency suggests the proposed ozone standard could prevent up to 400,000 pollution-induced coughing spells among children each year. As a result, fewer children would need medicine (or emergency treatment) for the symptoms of asthma or respiratory infection.

The dilemma comes in deciding just how much ozone is too much. In 1979, the EPA established the current standard, allowing 0.12 ppm of ozone during an hour's time. Scientists generally agree it's more realistic to measure ozone levels over an eight-hour period. But they don't agree on how much ozone should be allowed.

Like PM, the scientific debate over setting an ozone standard crosses into the realm of policy. At least part of Clean Air Act policy is out of step with current thinking. When enacted in 1970, the act became the first in a new era of environmental regulation. Basically, it calls for the EPA to do two things: set air standards that protect public health—including sensitive populations—with an adequate margin of safety, and disregard the cost of these standards.

Today, many scientists dismiss the logic of the first provision. To most researchers, the phrase "margin of safety" implies that some biological threshold exists for any given pollutant; for example that some level of ozone will cause health effects, while lower levels will have no effect. The goal, then, is to set an ozone standard at a level somewhere below that which causes *measurable* health effects.

In reality, however, researchers simply cannot define a threshold that guarantees zero health effects for everyone inhaling ozone. In its closure letter to Browner regarding the ozone standard, the CASAC panel wrote that "the paradigm of selecting a standard at the lowest-observable-effects level and then providing an 'adequate margin of safety' is no longer possible."

While this is old news to scientists, EPA standards must adhere to the Clean Air Act's statutory language. This forces the agency to dance around a policy widely acknowledged as misguided. "The bottom line is that setting the standard becomes a big judgment call," says McClellan. "What do you do about creating a margin of safety? This is one that Congress will end up debating."

Recent studies suggest that the number of adults in the United States aged 65 and over who risk suffering adverse health effects due to ozone pollution at levels below the current national air quality standard is 18.5 million.

State	County	1990 Population
CA	SAN JOAQUIN CO	480,600
CA	TULARE CO	311,900
CT	NEW HAVEN CO	804,220
DE	NEW CASTLE CO	441,900
GA	WASHINGTON CO	19,100
ID	BANNOCK CO	66,030
ID	BONNER CO	26,620
ID	SHOSHONE CO	13,930
IL	COOK CO	5,105,100
IL	DU PAGE CO	781,700
IL	LA SALLE CO	106,900
IL	MACON CO	117,200
IL	MADISON CO	249,200
IL	ROCK ISLAND CO	148,700
IL	RANDOLPH CO	34,600
IL	ST CLAIR CO	262,900
IL	WILL CO	357,300
IN	CLARK CO	87,800
IN	DUBOIS CO	36,600
IN	LAKE CO	475,590
IN	MADISON CO	130,700
IN	MARION CO	797,200
IN	VANDERBURGH CO	165,100
IN	VERMILLION CO	16,800
IN	VIGO CO	106,100
IA	BLACKHAWK CO	123,800
IA	CERRO GORDO CO	46,700
IA	CLINTON CO	51,000
IA	POLK CO	327,100
IA	SCOTT CO	151,000
KS	JOHNSON CO	355,100
KS	SEDGWICK CO	403,700
KS	WYANDOTTE CO	162,000
KY	BELL CO	31,500
KY	BOYD CO	51,200
KY	CAMPBELL CO	83,900
KY	DAVIESS CO	87,200
KY	FLOYD CO	43,600
KY	HARLAN CO	36,600
KY	HENDERSON CO	43,000
KY	JEFFERSON CO	664,900
KY	KENTON CO	142,000
KY	LAWRENCE CO	14,000
KY	MARSHALL CO	27,200
KY	PERRY CO	30,300
LA	OUACHITA PAR	142,200
MD	ANNE ARUNDEL CO	427,200
MD	BALTIMORE CO	692,100
MD	CECIL CO	71,300
MD	BALTIMORE	736,000
ME	CUMBERLAND CO	243,140
MI	MONROE CO	133,600
MI	WAYNE CO	2,111,700
MO	BUCHANAN CO	83,100
MO	JACKSON CO	633,200
MO	JEFFERSON CO	171,400
MO	ST LOUIS CO	993,500
MO	ST LOUIS	396,700
MT	FLATHEAD CO	59,220
MT	ROSEBUD CO	10,510
MT	SANDERS CO	8,670
NE	BUFFALO CO	37,400
NE	CASS CO	21,300
NE	DAWSON CO	19,900
NE	DOUGLAS CO	416,400
NE	LANCASTER CO	213,600
NE	OTOE CO	14,300
NJ	ATLANTIC CO	224,300
NJ	BERGEN CO	825,400
NJ	CAMDEN CO	502,800
NJ	ESSEX CO	778,200
NJ	GLOUCESTER CO	230,100
NJ	HUDSON CO	553,100
NJ	MERCER CO	325,800
NJ	PASSAIC CO	453,100
NJ	UNION CO	493,800
NJ	WARREN CO	91,600
NV	WASHOE CO	254,670
NY	BRONX CO	1,203,800

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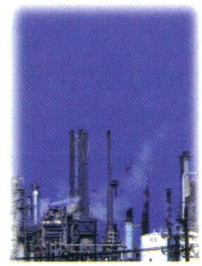

According to a 1994 American Lung Association report, an estimated 91 million Americans were potentially at risk for exposure to particulate matter air pollution by living in areas that are not protected by the current federal standard for particulate matter.

What Price Clean Air?

Meanwhile, economists and, increasingly, politicians take issue with the Clean Air Act's proviso that the EPA disregard cost in setting air standards. A health-only approach is the historical norm in federal environment policy. Over the past decade, however, talk of cost–benefit analysis has crept into most major regulatory discussions. The EPA's proposed air standards are no exception.

In 1996, Congress passed the Small Business Regulatory Enforcement Fairness Act, which requires any federal agency issuing a major rule to submit a cost–benefit analysis of that rule to Congress. Within 60 days, the House and Senate can jointly resolve to vote out the rule. If they don't, the rule then takes effect.

This time frame presumably relegates money talk to the period after the EPA issues its final air standards. But in reality, cost is very much a part of today's agenda. In December 1996, *The New York Times* got a copy of a draft letter from Chafee to EPA Administrator Browner. In the letter, Chafee discussed the need to weigh costs—not just health benefits—in setting ozone and PM standards. Questions of cost arose again this spring, when Congress held hearings on the proposed standards. Public health groups were outraged.

"This is a back-door attempt to get economics into the [Clean Air] statute, where it is clearly not allowed," declared Ron White, director of tobacco control and environmental health at the American Lung Association. "These standards are to tell the public when the air is healthful and when it is not healthful. Period."

Many analysts would like to circumvent this argument by making some form of cost–benefit analysis an explicit part of environmental regulation from the very beginning. "A health-only standard is simply naive," says Lester Lave, a professor of economics at Carnegie Mellon University in Pittsburgh, Pennsylvania. "If you're really going to protect the most sensitive populations with a margin of safety, then no level of air pollution is acceptable. We have to recognize that there is a balance here." That balance, Lave says, would surface if the EPA systematically examined all the costs and benefits of the proposed standards. In his analysis, the $PM_{2.5}$ standard would be worth the costs, while the ozone standard might not.

Kenneth Chilton, director of the Center for the Study of American Business at Washington University in St. Louis, Missouri, agrees. "I don't see large estimates of benefit coming from [the ozone standard]. What we need to do is make sure that a dollar's worth of benefit is generated for a dollar's worth of expense. If very small populations are affected, [new regulations] will generate small benefits."

Still, introducing cost–benefit analysis into health decisions is complicated by one major factor—a sense of fairness—says Thurston. "It's just not right that people should be getting sick because of the air and having to pay these health costs," Thurston says. "We should internalize the costs as a nation. Make the polluters—not the victims—pay. Because the costs are there right now. We're just going to transfer them."

Exposure to particulate air pollution can trigger asthma attacks and cause wheezing, coughing, and respiratory irritation in individuals with sensitive airways. Particulate matter is thought to be responsible for as much as 25% of "excess" deaths in heavily polluted areas.

The Impact

Transferring these costs, of course, hits industry hardest. Auto makers, power plants, steel mills, and other polluters would feel the pinch of new air standards as states draft plans to clean up local air. Industry leaders argue that the EPA's annual $8 billion cost estimate is far too low, and that it merely reflects the cost of getting counties into partial attainment status for the new standards.

"Remember that areas like Los Angeles, New York, and Washington, DC, have already been digging deep to cut back on emissions," says Paul Bailey, health and environmental affairs director at the American Petroleum Institute in Washington, DC. "So they're going to have to dig even deeper. We're talking about increased gas prices and electricity rates. Some areas might require carpooling, tighter inspections of automobiles. In some areas, boats may be affected."

The financial brunt of the standards, however, may strike the Midwest. Here, many states meet the current ozone and PM standards but not the proposed ones. In Missouri, half a dozen counties would immediately fall out of attainment status. In Nebraska, power plants might need to purchase costly catalytic converters like those found in cars. Ohio regulators would likely consider reformulating gasoline to be less polluting.

The irony, for many states, is that after years of pollution control, they have just recently been able to meet current standards. "It's frustrating because we just got switched to ozone attainment status (in Toledo, Dayton, and Cleveland) last November," says Schregardus. "That same month, EPA proposed changing the standard. If they do, we will fall back into nonattainment again."

It's too soon to say how much—and how quickly—the $PM_{2.5}$ air standard would impact states, says Wayne Kaiser, a scientist at the Kansas EPA. That's because both the EPA and individual states have little data on $PM_{2.5}$. "We're only going to be putting up $PM_{2.5}$ monitors for the first time next year to see whether these standards can be met," Kaiser says. "And the EPA is still in the process of approving reference monitors."

It's too soon to guess the fate of the EPA's proposed ozone and $PM_{2.5}$ standards. So far, observers say, Browner has stood firm under pressure from Congress and industry to reconsider the standards. If the proposed standards do become final, Congress may find it politically unpalatable to vote against them. By all accounts, Clinton will embrace the proposals as environmentally correct.

Ultimately, the standards could have a major health impact, predicts Koenig. "It's not out of the question that our lungs are being compromised," she says. "Every day, more stuff is being put into the air. Remember, we don't wake up and start over again. This is the same air we'll be breathing for the rest of our lives."

Kathryn S. Brown

According to an American Lung Association report, *The Perils of Particulates*, as many as 18,862,731 children under age 13 and 11,360,821 elderly people in the United States live in areas where the current federal standard for particulate matter is adequate to protect them from adverse health effects.

Outdoor air graphics source:
American Lung Association
fact sheets located on the World Wide Web at
(http://www.lungusa.org/noframes/global/news/report/viron/viroutdofac.html)
for ozone and at
(http://www.lungusa.org/noframes/global/news/report/viron/virmaterfac.html)
for particulate matter.

State	County	1990 Population
NY	KINGS CO	2,300,700
NY	NEW YORK CO	1,487,500
NY	PUTNAM CO	83,900
NY	RICHMOND CO	379,000
NC	MITCHELL CO	14,400
OH	ALLEN CO	109,800
OH	BELMONT CO	71,100
OH	BUTLER CO	291,500
OH	COLUMBIANA CO	108,300
OH	CUYAHOGA CO	1,412,100
OH	FRANKLIN CO	961,400
OH	HAMILTON CO	866,200
OH	HANCOCK CO	65,500
OH	JEFFERSON CO	80,300
OH	LAKE CO	215,500
OH	LAWRENCE CO	61,800
OH	LORAIN CO	271,100
OH	LUCAS CO	462,400
OH	MAHONING CO	264,800
OH	NOBLE CO	11,300
OH	RICHLAND CO	126,100
OH	SANDUSKY CO	62,000
OH	SCIOTO CO	80,300
OH	STARK CO	367,600
OH	TRUMBULL CO	227,800
OH	WYANDOT CO	22,300
OK	COMANCHE CO	111,500
OK	KAY CO	48,100
OK	MUSKOGEE CO	68,100
OK	MUSKOGEE CO	68,100
OK	TULSA CO	503,300
OR	LAKE CO	7,190
OR	LANE CO	282,910
PA	ALLEGHENY CO	1,336,400
PA	BERKS CO	336,500
PA	BUCKS CO	541,200
PA	CAMBRIA CO	163,000
PA	DELAWARE CO	547,700
PA	ERIE CO	275,600
PA	LACKAWANNA CO	219,000
PA	LANCASTER CO	422,800
PA	LAWRENCE CO	96,200
PA	LUZERNE CO	328,100
PA	LYCOMING CO	118,700
PA	MERCER CO	121,000
PA	PHILADELPHIA CO	1,585,600
PA	WESTMORELAND CO	370,300
PA	YORK CO	339,600
SD	PENNINGTON CO	81,300
TN	BLOUNT CO	86,000
TN	DAVIDSON CO	510,800
TN	HAMILTON CO	285,500
TN	KNOX CO	335,700
TN	MC MINN CO	42,400
TN	SULLIVAN CO	143,600
TN	UNION CO	13,700
TX	HARRIS CO	2,818,200
TX	NUECES CO	291,100
UT	SALT LAKE CO	725,960
UT	UTAH CO	263,590
VA	BRISTOL	18,400
VA	ROANOKE	96,400
WA	SPOKANE CO	361,360
WA	WALLA WALLA CO	48,440
WV	BROOKE CO	27,000
WV	HANCOCK CO	35,200
WV	OHIO CO	50,900
WI	MILWAUKEE CO	959,300
WI	WAUKESHA CO	304,700
		74,327,820

[a]This list is derived from a prediction of $PM_{2.5}$ levels based on analysis of monitored PM_{10} data and is, therefore, subject to significant uncertainty.

Source: EPA Office of Air and Radiation World Wide Web site at (http://ttnwww.rtpnc.epa.gov/naaqspro/).